SITE DIAGNOSIS BY PHYTOSOCIOLOGICAL INDICATION IN SOIL AMELIORATION EXPERIMENTS

Hermann Rodenkirchen

Chair of Soil Science, University, D-8000 Munich 40, Amalienstr. 52, W-Germany

In the last decades a lot of soil amelioration techniques have been used in Germany to improve soil fertility of sites degraded by litter removal in former times.Until now the success of these treatments was tested only by expensive and time consuming soil and foliar analysis or measurement of tree growth. This paper deals with selection of phytosociological indicators adapted for site diagnosis. The method was developed on two damaged soil forms (situated in different climatic regions of Upper Palatia), occupied with 75 to 105 year-old Scots Pine stands of site index III.5-IV.5. 27 experimental plots were included in the study, comprising the following treatments: CaP(KMg)-fertilization with different amounts of lime, combined with repeated input of nitrochalk or underplanting of the perennial legume Lupinus polyphyllus. 15-20 years after the beginning of the experiments various phytosociological parameters of groundvegetation were investigated and compared with soil properties (e.g., humusform, pH, supplies of nitrogen, phosphorus, bases), using correlation-, regression-, cluster- and stepwise discriminant analysis. The diagnostic value was tested for deviating amelioration procedures (and site conditions).

Results and conclusions:

1. The species composition is a sensitive parameter. Differential species can be used for instance as qualitative indicators of humus form.
2. Increased vitality of some constant and dominant species (Vaccinium myrtillus, Deschampsia flexuosa)reflects improved soil fertility on experimental plots.
3. The average nitrogen indicator value of vascular plants (ELLENBERG 1979) proved to be the best quantitative indication of soil fertility according to the multivariate,statistical analysis. It is significantly correlated with N-content of soil, N-nutrition and growth of trees.
4. The following parameters indicate pH (0-10 cm) exactly on both soil forms ($p < 0{,}001$):

Positive correlation:	Negative correlation:
Cover of dicot. herbs	Percentage of cryptogams,
Cover of ferns	living on very acid soils
average soil reaction	(JAHN 1980)
indicator value (ELLENBERG)	Cover of moss and lichen layer

Regression functions can be used for a quantitative diagnosis of soil acidity. The average soil reaction indicator value (ELLENBERG) is recommendable for a wide range of experimental designs (diagnostic errors were tiny on experimental plots with Alnus incana-stands, intensive soil tillage and strong disturbance of ground vegetation by grazing deer).
5. It is necessary to calibrate the diagnostic regression functions for every climatic region and soil form.They are not suitable for natural, undisturbed forest sites.
6. The indicator value of groundvegetation changes with succession of ecosystem. In the first years after amelioration procedures the dynamic of vegetation and soil properties may cause a faulty diagnosis.

References:

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